ABSTRACT

A pocket-size combination case and battery handle for attached otoscope and ophthalmoscope heads has an external shut-off switch and contains a swing-out holder for otoscope tips and a battery and wiring to both instruments. Each instrument may be individually swung out and rotatably adjusted at its end of the case to a plurality of operative positions. The electrical connection to each instrument is automatically made when it is swung out and is broken when it is returned to the case. Access to each instrument is by a separate hinged cover over half the case for each, the covers being alternatively spring biased to open or closed position.

11 Claims, 12 Drawing Figures
COMBINATION BATTERY HANDLE-CASE FOR A PAIR OF ATTACHED, OUTFOLDING ILLUMINATED MEDICAL INSTRUMENTS

BACKGROUND OF THE INVENTION

This invention relates to illuminated diagnostic instruments and relates more particularly to a combination pocket-sized carrying case and handle therefor, the instruments being attached and foldable outward to operating position.

Pocket-size or miniature diagnostic instruments have heretofore been known, usually provided with a clip for securing them in the pocket like a pen or pencil. Kits for pairs of illuminated instruments, such as an otoscope and an ophthalmoscope, are also known. Since each requires a battery handle, such kits usually provide a single handle with interchangeable heads. If the battery is rechargeable, a recharging unit is provided in the kit.

If a pair of miniature illuminated diagnostic instruments is needed, each must have a separate battery handle involving duplication of parts. If a common battery handle is provided, a time-consuming operation of removing one instrument head and replacing it with another is required of the user if his examination requires use of both instruments.

SUMMARY OF THE INVENTION

A single case of a size adapted to fit in a pocket or to be conveniently packed in a physician's bag is provided with a battery operatively secured therein and an otoscope head at one end and an ophthalmoscope head at the other end with wiring from the battery to each head including a shut-off switch accessible externally of the case. Two hinged covers are provided, one over one end-half of the case and the other over the other end-half. Spring means are provided for each cover for biasing the cover to closed position or, alternatively, retaining the cover in open position.

Each head has a generally tubular neck portion provided with a pair of diametrically oppositely projecting trunnions carried on a ring which is rotatable with respect to the neck. The trunnions are received in holes in a pair of pillow blocks secured to the floor of the case and a hole, half in the case end and half in the cover is provided so that the head may be swung on the trunnions to be folded out of the case or back in again when the cover is opened. The hole in the cover and case is made hexagonal reversely conforming to a cooperating hexagonal flange on the neck so that the head may be turned to a plurality of positions when it is folded out of the case and then secured in its selected position when the cover is closed.

The trunnions project from the neck spaced from its end and to this end a metal cup-shaped contact cap is threaded securely, the cap beingthreaded on a non-conductive portion of the neck. The otooscope and ophthalmoscope heads each contain a lamp bulb and the bulb may be changed by removing the cap and without removing the trunnions from their pillow blocks.

The wiring within the case comprises a circuit board secured to the floor of the case, the board bottom surface having what may be called separate positive and negative copper rails coated on the undersurface of the board and extending on opposite sides of the board from end to end. Battery clips are secured to the upper surface of the board and have contacts, one insulated and adapted to be electrically connected to one of the copper rails, and the other grounded to the clips and connected to the other rail for electrical contact with opposite ends of the battery.

At each end of the circuit board each copper rail is electrically connected to a leaf-spring type of contact, one being at all times in electrical contact with one of the pillow blocks and its contained trunnion, the trunnion ring being in contact with a metal portion of the instrument neck. The other contact rises substantially vertically from the case floor so that it is in electrical contact with the end cap contact at the end of the neck when the instrument head is folded out of the case and in contact with a nonconductive portion of the neck when the head is folded into the case.

The insulated battery contact is electrically connected by a very short piece of wire to the underside of the circuit board where there is a copper island separate from the two copper rails. A sliding switch button on the outer surface of the case floor may be moved from side to side to bring a bridging contact to a position electrically connecting the island with one of the rails or to a positive without electrical connection to the island or trail. To illuminate either head, the head must be folded out of the case and the bridging switch must be moved to its bridging position.

The otooscope head is of the type having a speculum portion adapted for use with a disposable tip. A speculum tip holder is provided alongside the neck of the folded-in otooscope. The holder comprises a shaft hingedly secured to the case so that it may be folded out of the case when its cover is open. The holder shaft has a rounded boss at its free end and this end is split so the tips may be telescoped together and slid down around the shaft and withdrawn as needed. The split enlarged end of the shaft provides a spring detent for the tips so that the tips cannot fall off the holder accidentally and the tips may be manually removed one at a time past this detent.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a case according to the invention as viewed from the cover side and with both instruments heads folded outside the case;

FIG. 2 is an enlarged plan view thereof with the head folded into the case and with both covers open;

FIGS. 3, 4, 5 and 6 are sectional views, respectively, on the lines 3—3, 4—4, 5—5 and 6—6 of FIG. 2;

FIG. 7 is an end view of the case as shown in FIG. 2 but with the cover closed;

FIG. 8 is a view similar to FIG. 1 as viewed from the switch side;

FIG. 9 is an enlarged fragmentary sectional view on the line 9—9 of FIG. 2 but rotated 90°;

FIG. 10 is a plan view of the circuit board assembly shown in FIG. 2, partially diagrammatic in that the conductive portion of the bottom surface is indicated by stippling, the switch contact member being shown in broken lines;

FIG 11 is an enlarged, fragmentary, sectional view on the line 11—11 of FIG. 8; and

FIG. 12 is an enlarged plan view of the contact member shown in FIG. 9 as viewed from the right in that figure.
DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the case 15 comprises a bottom half 16 and a top half consisting of two hinged covers 17 each over the opposite end halves of the case. An opthalmoscope head 18 is shown folded out of the case at one end and an otoscope head 19 is folded out of the other end. Ordinarily only one head is folded out of the case at a time in actual use.

In FIG. 2 the case 15 is shown open and the heads folded inside. A circuit board 20, shown more clearly in FIG. 10, is secured to the floor 21 of the bottom half 16 and covers the major portion of the floor. A metal channel 22, seen best in FIG. 10, has battery clips 23 and 24 secured by rivets thereto and posts from the floor extend through holes 25 and are headed over to secure the channel, clips, and circuit board to the floor. A battery 26 is secured in the clips.

Referring to FIG. 7, each end of the case has a hexagonal hole 27 therein, as shown, form half in the bottom 16 and half in the cover 17. Spaced from hole 27 each head is supported on a pair of pillow blocks 28, 28, secured by shanks driven into holes in the floor 21 and secured thereto by adhesive. The heads 18 and 19 each are supported on a neck around which there is a metal band 29 bearing diametrically opposite trunnions 30 projecting into holes in the pillow blocks 28. Best seen in FIG. 4, each band 29 has an upwardly extending projection 31 when the head is folded into the case. A finger on projection 31 pressing the projection toward the adjacent hole 27 folds or swings the head up and out of the case.

Referring to FIG. 9, the neck 32 for the opthalmoscope head 18 comprises an outer tubular layer of electrically non-conductive material and an inner tube 33 of metal containing the lamp bulb 34. A spring clip 35 encircles a portion of the outer contact of the bulb for ensuring a good contact with tube 33 and a spacer ring 36 of metal encircles tube 33.

A metal contact ring 37 is threaded securely to the end of tube 33 in contact with spacer 36. Ring 37 is the part on which the trunnion band 29 rotates and has an annular flange 38 the bank 29 being loosely confined between the end of the tubular neck 32 and flange 38. A warped or waved copper spring contact washer 39 encircles the ring 37 between flange 38 and band 29, as shown.

An insulator ring 40, of Nylon, is threaded to the outside of the end of ring 37 and a cup-shaped bulb-contact 41 is secured to the exterior of ring 40 by blunted threads on the interior of the metal contact cup to give the cup a self-threading grip on the ring 40. Contact cup 41 is slotted at 42 and contains a spider-like spring contact 43, shown in plan in FIG. 12, haviing a spring tongue 44 in contact with the center contact at the end of bulb 34.

It will be noted that neck 32 is formed with a hexagonal flange 45 adapted to lie in the hexagonal opening 27 of the case when head 18 is folded out. The other end of neck 32 and the interior of head 18 are not shown since they are shown and described in detail in U.S. Pat. No. 3,441,340 issued Apr. 29, 1969 to Moore et al.

The construction of the attached end of neck 46 of the otoscope head 19, shown in FIG. 4, is substantially the same as that described for the neck of head 18, the neck terminating in an insulated cup-contact 41 and having a similar hexagonal flange 45. An interiorly carried metal tube 47 surrounds the light bulb 48 and the electrical connections between contact 41 and the central contact of bulb 48 and between trunnions 30 and the other contact of bulb 48 are essentially the same as the electrical connections described in connection with FIG. 9. The interior construction of head 19 is the same as shown and described in U.S. Pat. No. 3,373,737 issued Mar. 19, 1968 to Moore.

Referring again to FIG. 2, upstanding bosses 50 from the floor 21 interiorly adjacent the holes 27 at either end of the case portion 16 form substantially semimetallic pockets in which semimetallic dust seals 51 of rubber or similar material are cemented. Similar bosses provided in the covers 17 house cooperating semimetallic seals 51', as shown in FIG. 7. The seals 51 and 51' close about cup contacts 41 of the heads when they are folded in and about the neck members 32 and 46 when the heads are folded out of the case.

Referring now to FIG. 10, the battery clips 23 and 24 are provided with spring contact members 53 and 54, respectively. The contact 53 is provided with a dimple at its center for electrical contact with one end of battery 26 and contact 54 has a contact member 55 at its center which is electrically insulated from contact member 54 and clip 24, the member 55 being adapted for electrical contact with the other end of the battery. Although positive and negative terminals are indicated on the battery 26, it will become apparent that the battery may be inserted in clips 23 and 24 as shown in FIG. 2 or reversed end for end.

As diagrammatically illustrated by stippling in FIG. 10 the undersurface of the circuit board 20 is divided into two separate copper coated trails 56 and 57 extending from end to end of the board and a separate copper coated island 58 adjacent the trail 56. The insulated contact 55 is electrically connected by a projecting metal member 59 and a short jumper wire 59' soldered to the conductive island 58 on the bottom surface of board 20.

Trail 56, at either end of the board, is electrically connected to an upwardly projecting leaf spring contact 60 adapted to contact the necks 32 or 46 of the respective heads when they are folded in or to contact the respective cup contacts 41 when the heads are folded out. The trail 57, at either end, is electrically connected to a leaf spring contact 61 which projects up and then endwise of the board for insertion in a hole in one of the pillow blocks 28 of each pair which extends normal to the trunnion hole, as shown in FIG. 4, so that each spring 61 is in electrical contact with one of the trunnions supporting each head. It will be understood that each spring contact 60 and 61 has an eyelet connected by a hollow rivet to board 20.

It will be noted that the circuit board 20 is shaped at either end to provide maximum clearance for the cup-contact 41 as it is folded in and out and a clearance space is provided along one side for the comparatively thicker otoscope head 19 when it is folded into the case.

Case 15 is of electrically non-conductive material, preferably of a strong plastic such as an ABS resin or similar material. Board 20 is supported on shouldered bosses projecting up from floor 21 and having reduced pin or stem portions adapted to pass through holes in the hollow rivets, through other holes 62 in the board.
or through holes 25 in the clips and be heat flattened to secure the board in place. One such hole 62 and its associated stem is shown in FIG. 11.

As indicated in FIG. 3, and more clearly shown in FIG. 11, the bottom surface of portion 16 of the case is provided with a sliding shut-off switch button 65 having a stem movable from side to side in a hole 66 through the case. A generally H-shaped sliding switch contact 67, indicated in plan in broken lines in FIG. 10, is secured to the stem of button 65 by an appropriate screw. The switch contact 67 has two contact arms 68, alternately in and out of electrical contact with island 58 and trail 56 as button 65 is slid from side to side. A double ended detent spring 69 is also secured to the button 65, each rounded end of spring 69 being engaged alternately in one of a pair of detent holes 70 formed in the floor 21 as the button is moved from one side to the other. It will be apparent that when the arms 68 are in contact with island 58 and trail 56 the switch will be in its "on" position and when the arms 68 do not contact the island and trail the switch will be in "off" position.

As shown in FIG. 2 and more clearly shown in FIG. 5, covers 17, 17 are secured to portion 16 by hinges 71 whose plates are pressed into slots formed in the walls of the covers and portion 16 and secured therein by adhesive. At its center each hinge half has a portion 72 engaged by a C-shaped spring 73 of the type which biases the cover 17 closed when in closed position and biases it open when opened as indicated at 17' in FIG. 5.

Since the otoscope head 19 is of the type requiring a disposable tip 75, as fully described in U.S. Pat. No. 3,146,775 issued Sept. 1, 1964 to Moore et al., a tip holder 76 is provided in the case alongside the head 19 as shown in FIG. 2. Referring to FIG. 6, a hinge member 77 has a flange portion pressed into a cooperating groove in the case portion 16 and adhesively secured therein. Th holder 76 itself comprises a post having one end secured to the hinge member 77 by an appropriate pivot pin, as shown and has its other end enlarged at 78 and bifurcated, as shown. Adjacent the hinge member 77, the holder 76 has a tip-contacting annular flange 79. The tips may be nested and slipped down over the holder, the holder being adapted to carry five tips. A sixth tip may be carried on the head 19.

When a new tip is desired, the holder 76 may be easily folded upward by a fingertip placed on the lower edge of the lowermost lip on the holder and moved endwise of the case. When the holder projects upward the tip may be easily moved past the retaining enlargement 78 because of the spring action provided by the bifurcation.

In operation, either cover 17 may be easily raised by a fingertip by reason of the notches 80 provided in the lip of the case portion 16 as shown in FIGS. 1 and 2.

Either head 18 or 19 may selectively be folded upward by placing a fingertip on the upward projection 31 of the trunnion band of the respective head and moving the projection endwise of the case. The head may then be grasped and folded completely outward and the angular direction of the distal end of the instrument may be adjusted by turning the head in its band 29. Since the flange 45 of the head and its cooperating hole 27 are hexagonal, six different adjusted instrument directions are possible when the cover 17 is closed.

The selected illuminated diagnostic instrument head may then be used in the manner usual for such an instrument, using the switch button 65 for turning the illumination of the head on or off as desired. It will be noted also that, even if switch 65 is inadvertently left in its "on" position when the selected head is folded back into the case, the head cannot remain illuminated after it has been folded into the case because its contact 60 is no longer in contact with the cupped contact 41 of the head.

Replacement of either of the lamp bulbs 34 or 48 may be made by inserting a coin in slot 42 and unscrewing the cup contact 41 when it is in the position shown in FIG. 7.

While the heads shown and described are otoscope and opthalmoscope heads, it will be apparent that miniature heads for other illuminated diagnostic instruments may be substituted or one of the heads may be replaced by a miniature flashlight head.

By miniaturization and maximum space utilization the case described above has maximum dimensions in all directions of substantially 5 inch X 2 3/4 inch X 1 1/16 inch and, fully equipped, weighs less than 6 oz.

We claim:

1. A combination battery handle and case for a plurality of illuminable diagnostic instruments, the case having a main body portion and hinged cover means therefor, a plurality of instruments normally contained in the interior of the case, each instrument having its own lamp, the instruments being pivotally secured to the body portion and foldable outward therefrom and back therein upon opening the cover means, the case having holes through which the instruments project when folded outward, the body having secured therein battery means and means for electrically connecting the battery to the lamps of the instruments when the latter are folded outwardly, the case being adapted to operate as a handle when one of the instruments is folded outwardly for use and at the same time serving as a case for the other instrument.

2. A pocket size combination battery handle and case for a pair of medical instruments comprising an elongated body portion, a spaced pair of upstanding pillow blocks adjacent each end of the case and secured thereto, a pair of medical instrument heads each having a neck portion, a slip-ring band rotatably secured around each neck, each band having a pair of diametrically opposite metal trunnions projecting therefrom and receiving in cooperating holes in respective pillow block pairs whereby the heads may be alternately folded into the case and folded out to project from the case end, the heads in folded out position being rotatable relative to the case, and a cupped cover hingedly secured to the body for enclosing each head in the case when folded therein.

3. A pocket size combination battery handle and case for a pair of illuminated diagnostic instruments comprising an elongated body portion, a spaced pair of upstanding metal pillow blocks spaced from each end of the case and secured thereto, a pair of diagnostic instrument heads each having a neck portion and a lamp bulb therein, a metal slip-ring band rotatably secured around each neck, each band having a pair of diametrically opposite metal trunnions projecting therefrom and received in cooperating holes in respective pillow block pairs whereby the heads may be alternately folded into the case and folded out to project from the
case end, a cupped cover hingedly secured to the body for enclosing each head in the case when folded therein, battery clips secured to the body portion, a battery in the clips, each clip having a battery contact for electrical connection to a different battery end, one battery contact being electrically insulated from the clip and electrical connection means secured to the body including a switch operable from outside the case, the connection means adapted for completing an electric circuit through the switch to the respective heads when the head is folded out of the case, each instrument neck having a tubular metal member electrically connecting the trunnion band to one contact of its lamp and each neck terminating in a cupped metal cap electrically connected to the other lamp contact and insulated from the remainder of the neck.

4. The combination battery handle and case defined in claim 3 wherein the electrical connection means includes for each head a first leaf contact for connecting one side of the battery to one of the trunnions and a second leaf contact adapted to be in electrical contact with the metal cap of the head when the head is folded out and to be in contact with a nonconductive portion of the neck when the head is folded in, whereby the head cannot be illuminated when folded in the case.

5. The combination battery handle and case defined in claim 4 wherein the electrical connection means includes a circuit board secured to the body portion, the board having a first trail of metal coating on the board surface from end to end electrically connecting both of the first leaf contacts with one of the battery clip contacts, and a second metal trail coating electrically connecting both of the second leaf contacts with the other battery clip contact through the switch, the board having an island of metal coating electrically connected to said other battery clip contact, and the switch including a metal contact member movable from a first position electrically connecting one of the metal trails with the island to a second position breaking its electrical connection between the trail and the island.

6. The combination battery handle and case defined in claim 3 wherein the case has a hole of a regularly polygonal shape therethrough at each end when the cover is closed, half the hole being through the body and half through the cover, and each instrument neck has a cooperating reversely conforming polygon shaped flange therearound adapted to be contained in the case hole when the cover is closed and the head is folded out, whereby the instrument may be secured in one of a plurality of radial positions with respect to the case.

7. The combination battery handle and case defined in claim 6 wherein each cover and each end of the base has a substantially semiannular dust seal of resilient material secured thereto adjacent the regular polygonal hole, the seals being positioned when the cover is closed to close about an instrument neck when the instrument is folded out and to close about the cupped cap contact when the instrument is folded in, thereby keeping out unwanted debris when the case is transported in a coat pocket.

8. The combination battery handle and case defined in claim 6 wherein each cupped cap is slotted and in threaded contact with the instrument neck, and each lamp bulb is slideably retained within its neck by the cap, whereby the bulbs may be easily replaced by removing the cupped caps.

9. The combination battery handle and case defined in claim 3 wherein each cover hinge has a C-shaped leaf spring biasing a portion of each spring half toward the other, whereby the cover is biased closed after it has been locked and biased open after the cover has been fully opened.

10. The combination battery handle and case defined in claim 3 wherein each slip ring band has a portion projecting away from the body portion when the instrument is folded in, whereby a ringer placed on the projecting portion and moved toward the adjacent case end tilts the instrument away from the body portion for folding the instrument out of the case.

11. The combination battery handle and case defined in claim 3 wherein one of the instrument heads is an otoscope adapted to use disposable speculum tips, the case having a spare tip holder adjacent the otoscope head, the holder having an elongated member hingedly secured to the case body at one end, the elongated member having an annular flange adjacent the hinged end and a pair of semiannular enlargements at its free end, the free end being bifurcated and of resilient material, whereby the holder is adapted to receive a plurality of nested tips therearound, the annular flange providing a stop for the larger end of the nested tips and the semiannular enlargements providing a spring detent over which the smaller distal ends of the tips may be withdrawn.

* * * * *
UNIVERS STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,812,847 Dated May 28, 1974

Inventor(s) William C. Moore & John D. Connors

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Under "Summary of the Invention" Col. 2, line 25, "positive" should be -- position --; line 40, "hat" should be -- that --.

Under "Description of the Preferred Embodiment" Col. 3, line 21, "forme" should be -- formed --; line 23, "i" should be -- is --; line 56, "havinja" should be -- having a --; Col. 4, line 10, "to Moore" should be -- to Moore et al. --; line 45, "receptive" should be -- respective --; line 57, "rovide" should be -- provide -- and in Col. 6, line 49, "receiving" should be -- received --.

In Claim 10, line 29, "ringer" should be -- finger --.

Signed and sealed this 1st day of October 1974.

(SEAL)
Attest:

McCoy M. Gibson Jr. C. Marshall Dann
Attesting Officer Commissioner of Patents